

A. Background



Welcome to the 21st century!!! We have synthetic biology, nuclear powerplants, nanotechnology, bunch other of cool stuffs...

and

7,367,655,413

People to feed...

The question is... are our development enough... for **All** of us? Is it enough just for basic life with basic human rights?

1. Population Growth and Food Growth Rate

A cleric once said (**WARNING!** If you are TL;DR person, skip to next paragraph!):

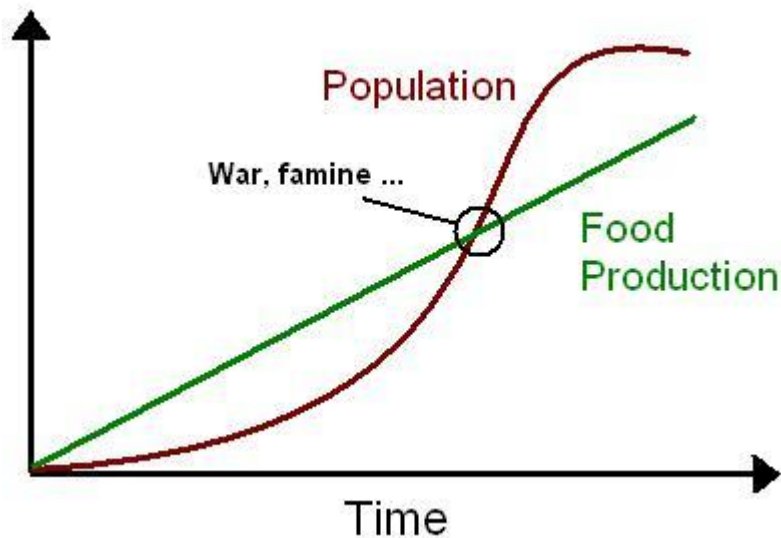
- **food production** tends to increase **arithmetically**, **population** tends to increase naturally at a **geometric** rate
- That the increase of **population** is necessarily **limited** by the means of **subsistence**,
- That population does invariably increase when the means of subsistence increase, and,
- That the **superior power of population** is **repressed**, and the actual **population** kept **equal** to the means of **subsistence**, by **misery** and **vice**

This cleric... is none other than **Thomas Robert Malthus**. A British economist, whose name etched for more than 150 years... since his death in 1834 until now 2015...

What he said basically is that **earth** is not enough for **human population growth**

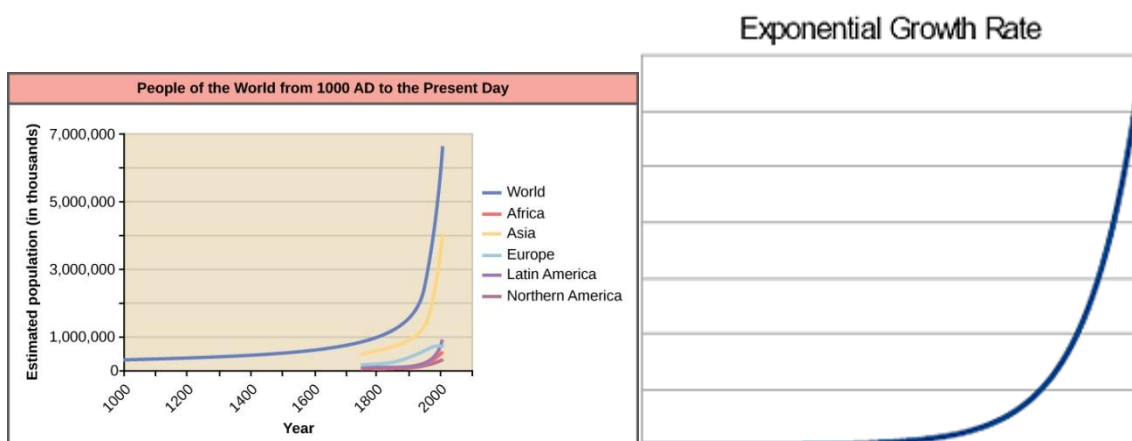
Human growth will eventually lead to **food crisis** in the population... and lead to disruption of peace in the population. As the one that is hungry/ poor try to steal from the one that is full/rich. This will lead

A term was coined for this breaking point.... **Malthusian catastrophe**...



This is not merely a theory....

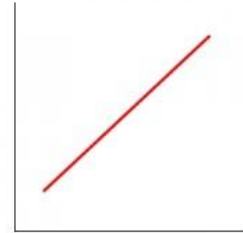
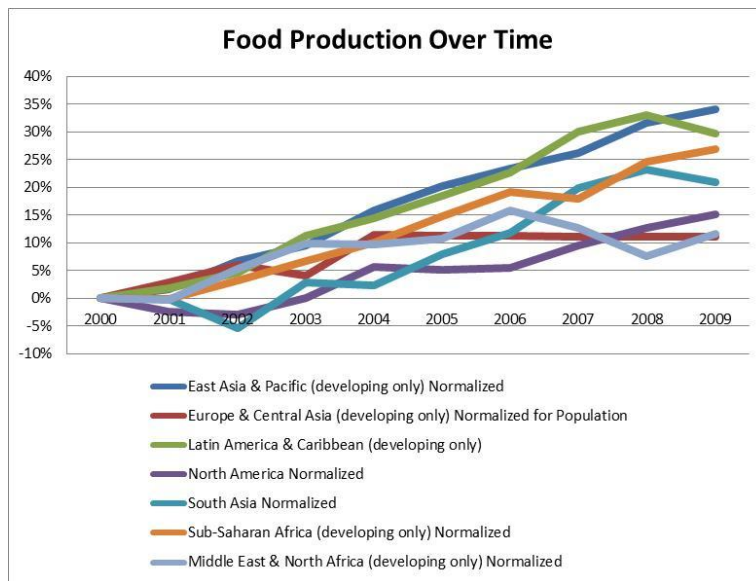
Graphs below show the **population growth**



Source: <http://cnx.org/contents/9bf55f5c-6f4b-40d8-bc99-873d021291c3@4/Human-Population-Growth>

This shows **exponential growth pattern**

As for **food production growth**



Source: <http://www.newsustainabilityinc.com/2015/01/28/food-waste-critical-solvable-sustainability-issue/>

Clearly shows **linear pattern**

What does all of this means? It is just as Malthus has stated more than 150 years ago...

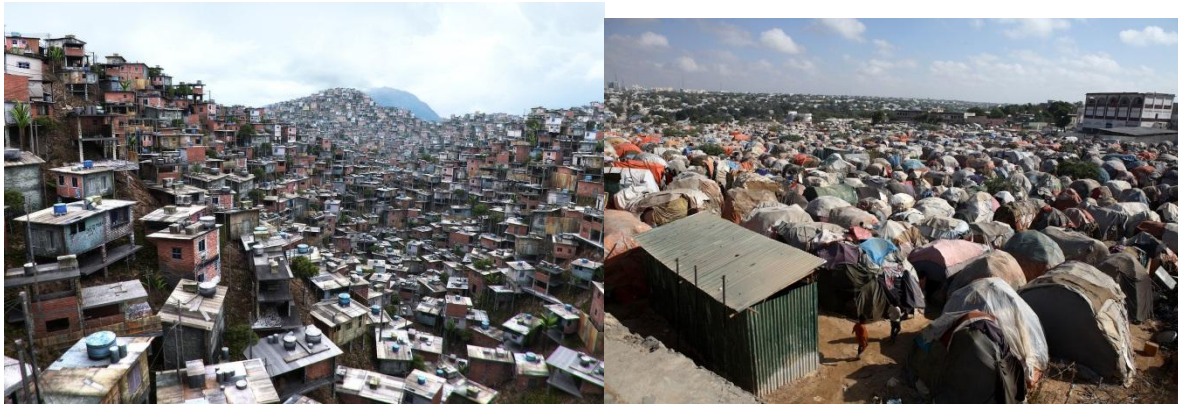
Inequality arise

The problem which arise can easily spotted in the **Millenium Development Goals (MDGs)**

2. MDGS Goals

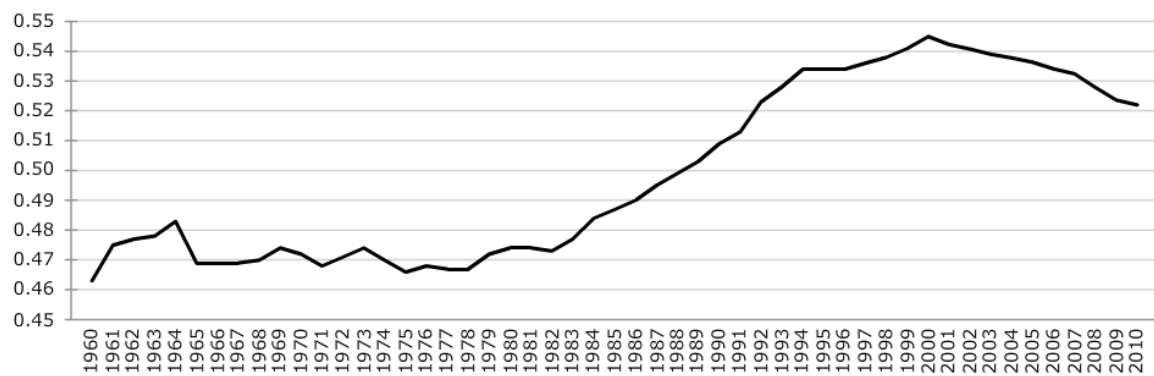
MDGs





World Inequality

(global Gini index where 0 represents exact equality and 1 represents total inequality)



<http://peterslarson.com/tag/gini-coefficient/>

(Gini coefficient shows wealth inequality in the world)

3. Gap



Gap

The current population growth can only be controlled by government intervention through contraception. However, in Indonesia, contraception is failing. Graph below shows Indonesian Total Fertility Rate. Increase in number means increase in fertility, thus failure in contraception. The desired value is 2.1



4. Status Quo of Contraception Method

Thus we analyze the status quo of contraception method

It turns out... every contraception method has advantage and disadvantages

Method of Contraception	Advantage (s)	Disadvantage (s)
Hormonal (progesteron pill, hormonal injection, implant, patch)	For pill(s): high effectivity, easy to get, cheap Organize menstrual cycle Readily reversible	Inconvenience: Needs to be consumed EVERYDAY! (for pills) Needs to be injected every month (for injection) Hormonal side effects
Intra-Uterine Device (IUD)	Effective Long term contraception	Inconvenience at intercourse Application needs professional Cause abdominal cramps Not readily reversible
Barrier	Effective Easy to apply	Inconvenience at intercourse
Information	Easy to apply	Kurang efektif
sterilisasi	Effective	Not reversible

Eventually, every method has inconvenience

Problem Solving

To solve the problem, Team iGEM UI Indonesia try to create the **Ideal Contraception**

Thus we have to fulfill these criteria:

- Inexpensive
- Easy to apply (does not need professional) minimal side effect
- Readily reversible
- Easy to reach
- Effective

This all actually can be resumed in one word:

Reversible Sterilization